CLAIMS

1. Process for the pneumatic conveyance of powdered material, especially powder coating material, in which a cylindrical chamber, which can be connected with a reservoir by a sealable inlet and with a delivery line by a sealable outlet, is alternately filled with material from the reservoir and emptied of this material by applying a negative pressure to the chamber with its outlet closed and its inlet open through a bordering wall formed by a gas-permeable filter element to draw material into the chamber from the reservoir, and by then admitting a gas under pressure into the chamber with its inlet closed and its outlet open to force the material previously drawn into the chamber out of the chamber and into the delivery line, characterized by the fact that the gas-permeable filter element (50) is designed as a hollow cylinder and surrounds at least a portion of the chamber (10, 12).

2. Process in accordance with Claim 1, characterized by the fact that the chamber (10, 12) is emptied by admitting compressed gas into it through the filter element (50).

3. Process in accordance with Claim 1 or Claim 2, characterized by the fact that, to clean the chamber (10, 12), compressed gas is admitted into the chamber (10, 12) through a cleaning valve (84) and flows past the filter element (50).

4. Process in accordance with any of the preceding claims, characterized by the fact that the negative pressure is generated by a vacuum injector (58) acted on by compressed gas.

5. Process in accordance with any of the preceding claims, characterized by the fact that the conveyance is carried out with two parallel chambers (10, 12), one of which is being filled from a reservoir (6), while the other is being emptied into the delivery line (28).

6. Process in accordance with Claim 5, characterized by the fact that the inlets (14, 16) and the outlets (18, 20) of both chambers (10, 12) are opened and closed by two sealing

mechanisms (30, 32), such that one of the sealing mechanisms (30, 32) closes the inlet (14; 16) of one of the two chambers (10; 12) and simultaneously opens the inlet (16; 14) of the other chamber (12; 10), and the other sealing mechanism (30, 32) opens the outlet (18; 20) of one of the chambers (10; 12) and simultaneously closes the outlet (20; 18) of the other chamber (12; 10).

7. Process in accordance with Claim 5 or Claim 6, characterized by the fact that the application of a negative pressure to one of the chambers (10; 12) and the simultaneous admission of compressed gas into the other chamber (12; 10) are effected by a single multiple-way control valve (66).

8. Device for the pneumatic conveyance of powdered material, especially powder coating material, with a cylindrical chamber, which can be alternately connected by a sealable inlet with a reservoir and by a sealable outlet with a delivery line, which has a bordering wall formed by a gas-permeable filter element, and to which negative pressure can be applied through the filter element to draw gas out of the chamber and to fill the chamber with material from the reservoir through the open inlet with the outlet closed, and into which compressed gas can be admitted to force the material, which had previously been drawn into the chamber, into the delivery line through the open outlet with the inlet closed, characterized by the fact that the filter element (50) is designed as a hollow cylinder and surrounds at least a portion of the chamber (10, 12).

9. Device in accordance with Claim 8, characterized by the fact that the filter element (50) extends over more than one third of the length of the chamber (10, 12) between the inlet (14, 16) and the outlet (18, 20).

10. Device in accordance with Claim 8 or Claim 9, characterized by the fact that a

circumferential wall section (42) of the chamber (10, 12) is designed to be pliable on both sides of the filter element (50), and that a pneumatic pinch valve (30) is installed at the inlet (14, 16) and at the outlet (18, 20).

11. Device in accordance with any of Claims 8 to 10, characterized by the fact that the inside diameter of the filter element (50) basically corresponds to the inside diameter of adjoining circumferential wall sections (42) of the chamber (10, 12), the inside diameter of a feed line (24) between the chamber (10, 12) and the reservoir (6), and/or the inside diameter of the delivery line (28).

12. Device in accordance with any of Claims 8 to 11, characterized by the fact that the inlet (14, 16) and the outlet (18, 20) are located at opposite ends of the chamber (10, 12).

13. Device in accordance with any of Claims 8 to 12, characterized by the fact that the filter element (50) is made of a sintered material.

14. Device in accordance with Claim 13, characterized by the fact that the filter element (50) is made of sintered plastic powder.

15. Device in accordance with any of Claims 8 to 14, characterized by the fact that the filter element (50) has a pore size of less than 20 μm and preferably less than 5 μm.

16. Device in accordance with any of Claims 8 to 15, characterized by the fact that the filter element (50) is surrounded by a housing (52), which is separated from the filter element (50) by a cylindrical annular space (54) and has at least one connection (56) that can be connected with a negative pressure source (58) and/or with a compressed gas source (48).

17. Device in accordance with any of Claims 8 to 16, characterized by the fact that the housing (52) has a negative pressure connection (104) on the outlet side and a compressed gas connection (106) on the inlet side.

18. Device in accordance with any of Claims 8 to 17, characterized by the fact that, to clean the chamber (10, 12), compressed gas is admitted into the chamber (10, 12) through a cleaning valve (84) and flows past the filter element (50).

19. Device in accordance with Claim 18, characterized by the fact that the cleaning valve (84) has a diaphragm (94), which is elastically deformed during the admission of compressed gas through the cleaning valve (84) to open an intake port into the chamber (10, 12) and is elastically restored upon completion of the admission of compressed gas to close the intake port.

20. Device in accordance with any of Claims 8 to 19, characterized by at least one vacuum injector (58) for applying negative pressure to the chamber (10, 12).

21. Device in accordance with any of Claims 8 to 20, characterized by two chambers (10, 12), one of which can be connected with the reservoir (6) by opening its inlet (14; 16), and the other can be connected essentially simultaneously with the delivery line (28) by opening its outlet (20; 18) and vice versa.

22. Device in accordance with Claim 21, characterized by two sealing mechanisms (30, 32), one of which closes the inlet (14; 16) of one of the two chambers (10; 12) and simultaneously opens the inlet (16; 14) of the other chamber (12; 10), and the other opens the outlet (18; 20) of one of the chambers (10; 12) and simultaneously closes the outlet (20; 18) of the other chamber (12; 10).

23. Device in accordance with Claim 22, characterized by the fact that each sealing mechanism (30, 32) has a double-acting pneumatic cylinder (32) with two oppositely directed piston rods (34), whose ends (36) press against a pliable circumferential wall section (42) of the adjacent chamber (10, 12) to close its inlet (14, 16) or outlet (18, 20).

24. Device in accordance with any of Claims 21 to 23, characterized by a single

multiple-way control valve (66) for simultaneously applying negative pressure to one chamber (10; 12) and admitting compressed gas into the other chamber (12; 10).

25. Device in accordance with Claim 24, characterized by the fact that the multiple-way control valve (66) can be operated together with at least one additional multiple-way control valve (44, 46) in a compressed air feed line to the pneumatic cylinders (32) of the two sealing mechanisms (30, 32).

26. Device in accordance with any of Claims 21 to 25, characterized by the fact that the two chambers (10, 12) are connected by Y-shaped sections of line (22, 26) with a feed line (24) that leads to the reservoir (6) and with the delivery line (28).

27. Device in accordance with Claim 26, characterized by the fact that the conveyance path in the region of the Y-shaped sections of line (22, 26) has bends of less than 30°.